

# **Summary of a Survey of Aquarium Owners in Canada**

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2009

**Canadian Manuscript Report of  
Fisheries and Aquatic Sciences 2905**



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Cat. No. Fs 97-4/2905E ISSN 0706-6473

Correct citation for this publication:

Marson, D., B. Cudmore, D.A.R. Drake, and N.E. Mandrak. 2009. Summary of a survey of aquarium owners in Canada. *Can. Manusc. Rep. Fish. Aquat. Sci.* 2905: iv + 20 p.

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## ABSTRACT

Marson, D., B. Cudmore, D.A.R. Drake, and N.E. Mandrak. 2009. Summary of a survey of aquarium owners in Canada. *Can. Manusc. Rep. Fish. Aquat. Sci.* 2905: iv + 20 p.

The “Great Canadian Aquarium Survey” was led by the Ontario Federation of Anglers and Hunters (OFAH), along with partner organizations, both as an online and paper questionnaire to determine the origin and fate of aquatic invasive species (AIS) in the aquarium trade. A total of 917 surveys were completed, of which 794 (86%) respondents indicated they had an aquarium. Results from the survey indicated the use of eight aquatic invasive plant species, by multiple respondents, and three aquatic invasive fish species, each of which were owned by at least one respondent. Analyses of the purchase locations and aquarium locations indicated relatively small mean travel distances (mean Euclidean distance was 89.61 km), but were notable for high variability and extreme positive skewness signifying rare, long-distance travel distances. The survey results indicate that the aquarium trade should not be overlooked as a vector for aquatic invasive species into Canadian freshwaters.

## RÉSUMÉ

Marson, D., B. Cudmore, D.A.R. Drake and N.E. Mandrak. 2009. Summary of a survey of aquarium owners in Canada. *Can. Manusc. Rep. Fish. Aquat. Sci.* 2905: iv + 20 p.

Afin de déterminer l'origine et le sort des espèces aquatiques envahissantes (EAE) dans le commerce des espèces destinées aux aquariums, la Fédération ontarienne des pêcheurs à la ligne et des chasseurs (Ontario Federation of Anglers and Hunters – OFAH), de pair avec d'autres organismes partenaires, a mené un grand sondage canadien sur les aquariums à l'aide d'un questionnaire en ligne et sur papier. Sur un total de 917 répondants, 794 (86 %) ont indiqué qu'ils avaient un aquarium. Les résultats du sondage révèlent qu'un nombre important de répondants possèdent huit espèces végétales aquatiques envahissantes et que chaque répondant a au moins une des trois espèces animales envahissantes recensées. Les analyses des données sur le lieu d'achat et l'emplacement des aquariums indiquent des distances moyennes de parcours relativement faibles (distance euclidienne moyenne de 89,61 km). Ces analyses révèlent cependant une grande variabilité et une asymétrie positive élevée, ce qui signifie que les espèces végétales et animales en cause sont parfois transportées sur de longues distances. Les résultats du sondage démontrent que le commerce lié aux aquariums ne devrait pas être sous-estimé en tant que porte d'entrée des espèces aquatiques envahissantes dans les eaux douces canadiennes.



## INTRODUCTION

Aquatic invasive species (AIS) have been, and will continue to be, introduced into Canadian freshwaters through various vectors including stocking (authorized and unauthorized), canals and diversions, ballast water, baitfish use, live fish markets, pet stores, and garden centres. An understanding of the relative risk of each of these vectors is essential in prioritizing and directing prevention efforts. Data exist for stocking (OMNR, unpubl. data), canals and diversions (Emery 1981), ballast water (Ricciardi and Rasmussen 1998), and live fish markets (Cudmore and Mandrak 2004, Goodchild 1999 and Rixon et al. 2005), but are poor for baitfish (Goodchild 1999b, Litvak and Mandrak 1993), and pet stores (Rixon et al. 2005), due to limited sample sizes, and are totally lacking for garden centres.

To determine the origin and fate of aquatic invasive species in various live trade pathways, surveys were conducted by the Ontario Federation of Anglers and Hunters, along with partner organizations (Ontario Ministry of Natural Resources and others), with Fisheries and Oceans Canada providing scientific information. A survey was produced, in both paper and online formats, and marketed to individuals during trade show events most likely to result in the congregation of the targeted market (such as the All About Pets Show, Canada Blooms, and the Spring Fishing Show). Three surveys were developed and specifically directed to aquarium owners, the users of baitfish, and water garden owners. The results of these surveys will be used to contribute information to the risk assessment being currently undertaken on live trade pathways.

The “Great Canadian Aquarium Survey” was developed to determine the origin and fate of aquatic invasive species in the aquarium trade. The survey included questions regarding the specific plant and fish species added to the respondent’s aquarium, where they were purchased, and what was done with them when no longer wanted. A question regarding the selection of plants and animals used by respondents included a list of common aquarium fish and plant species, including eight aquatic invasive plant species: Brazilian waterweed (*Egeria densa*), Eurasian water milfoil (*Myriophyllum spicatum*), fanwort (*Cabomba caroliniana*), hydrilla (*Hydrilla verticillata*), parrot’s feather (*Myriophyllum aquaticum*), water fern (*Salvinia minima*), water hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*); and two aquatic invasive fish species Common Carp (*Cyprinus carpio*) and Goldfish (*Carrasius auratus*). Surveys were limited to 15 questions (an additional survey of 10 questions was provided to respondents for updating plants/animals added to the aquarium).

## MATERIALS AND METHODS

The “Great Canadian Aquarium Survey” was produced as an online and paper questionnaire. Both forms of the survey were made available during trade shows and the online version of the survey was developed using SurveyMonkey ([www.surveymonkey.com](http://www.surveymonkey.com)). The survey was comprised of 15 questions, most of which were of multiple choice format (see Appendix 1 for the complete survey). The survey

consisted of questions regarding the number and size of aquaria, types of plants and animals added, where they were purchased (or collected), and how they were disposed of. The intention was to create a survey that was succinct so that individuals would complete it, while providing as much relevant detail as possible for informing the risk assessment. Each survey required approximately 10 minutes to complete.

The survey was first distributed to Ontario recipients at the "All About Pets Show", April 6-9, 2006. Both paper and online versions of the survey were provided in a trade show booth designed specifically for survey respondents. Individuals who were unable to complete the survey at the trade show booth were provided with information on how to access the website (promotional material including magnets, mouse pads, and pens that advertised the survey and included the website address), and paper copies were distributed to those preferring that format. Completed paper copies of the survey were subsequently entered into the online database for analysis.

Following the "All About Pets Show", the survey was advertised at additional trade shows, in several magazines, at aquarium retailers, and online through various partner organizations involved in the aquarium trade.

## RESULTS

### NUMBER OF SURVEYS COMPLETED

A total of 917 online and paper surveys were completed. Of those completed, 794 respondents (86%) indicated that they had at least one aquarium, and 20 respondents repeated the questions a second time according to the addition of plants and animals to their aquariums. While many of the questions were mandatory to complete in order to proceed to the next question in the survey, several were not properly completed; therefore, the sample size varies between questions. Of the 917 surveys taken by respondents with aquaria, 799 (87%) were answered to completion, however, a total of 125 respondents (14% of those surveyed) did not own an aquarium, eliminating further response throughout the bulk of the survey. In addition, a large percentage of respondents failed to provide responses to certain questions, including 490 respondents who skipped answering both how large and how many aquaria they owned.

Many of the questions had multiple answers from the respondents (i.e. plants/animals purchased from multiple locations) leading to cumulative totals of answers being greater than the total number of respondents for some questions.

The survey results provide information on a variety of aquarium-related questions, including the number and size of aquaria owned, the types of plants and animals added, where the plants and animals were acquired, and what was done with the plants and animals when they were no longer wanted.

## **SIZE DISTRIBUTION OF AQUARIA**

Of the 794 respondents who indicated they had an aquarium, 427 (54%) indicated the number and cumulative size of their aquaria. Respondents most often had a single aquarium (17%), followed by those with greater than five aquaria (14%). Aquarium ownership frequently totaled a cumulative aquarium size of greater than 99 gallons (44%). Aquarium ownership was lowest in the <5 gallon category and increased with each corresponding increase in cumulative aquarium size. The distribution of the number of aquaria owned and their total size (in gallons) is shown in Figs. 1 and 2.

## **ORIGIN AND TYPE OF PLANTS AND ANIMALS USED IN AQUARIA**

The selection of plants added to aquaria was the focus of the next five questions in the survey. A variety of aquatic plant species was listed, as well as the opportunity for respondents to manually add other species/varieties in addition to choosing those listed. The most popular plants were hornwort, fanwort, and water lettuce, but all the plants listed were used by at least five respondents, including eight aquatic invasive species (Fig. 3, Table 1). Of the respondents who indicated other, java moss/java fern were most common (40%), followed by Amazon sword plants, *Echinodorus* sp. (39%), *Anubias*, *Anubias* sp. (31%), *Cryptocorynes*, *Cryptocoryne* sp. (30%), and *Vallisneria*, *Vallisneria* sp. (22%).

Following the questions on what types of plants were added to the aquarium were questions regarding the type of store they were purchased from and the purchase location (city, province). Pet stores were the most common location for plant purchases (79%), followed by aquarium clubs (31%), and from friends (25%, Fig. 4). The total of the percentages is greater than 100 since several respondents acquired plants from multiple locations.

There were a total of 220 respondents who submitted the purchase locations of their plants. While plants can be ordered by internet or mail order, very few respondents purchased plants in this manner (6%).

When aquarium plants were no longer wanted, they were most often thrown into the garbage/compost (70%), or given to a fellow aquarist (49%, Fig. 5). Plants were also returned to the purchase location (9%), or released into the wild (1%). Responses from the 'other' category included never needing to dispose of any plants (45%), selling at fish auctions (33%), and flushing down the toilet (2%). Responses from the 'other' category were frequently a repetition of the answers given in the multiple choice format (20% of 'other' category answers were exact repetitions of the answers given in the multiple choice format).

There were a total of 418 respondents (53%) who indicated animals were added to their aquaria. The most commonly added animals include tetras (46%), cichlids (45%), and *plecostomus* sp. (43%). There were an additional 11 common fish species (of the 29 listed) found in more than 20% of respondents' aquaria (Fig. 6). Species were also

listed by respondents in the 'other' category, but it was mainly used by respondents to list the variety of species within the generic fish headings (e.g. respondents who indicated the presence of cichlids would use the 'other' category to recite the full list of cichlid species present in their aquaria). The 'other' category did, however, include species of concern, including red-eared sliders (*Trachemys scripta elegans*), several varieties of Goldfishes and koi, snails, freshwater shrimps, and, of particular concern, was a reference to a snakehead (*Channidae* sp., Table 1).

Animals were most often bought from a pet store (91%), acquired from a friend (28%), or from an aquarium club (27%). Additional sources include mail order, garden centers, and capturing from the wild (Fig. 7). Responses given in the 'other' category were divided between pet stores (47%), auction/breeder (41%), and acquiring from friends (12%).

Aquarium animals that were no longer wanted were most often given to other aquarists (61%), or returned to the store where they were purchased (42%). Respondents also indicated that animals were disposed of in the garbage/compost (16%), as well as some who indicated the animals were released into the wild (2%). Of the respondents who indicated 'other', the majority suggested they had never had aquarium animals they wished to part with (46%), that the animals were sold (29%), disposed of down the toilet (9%), fed to other animals (5%), or released into the wild (2%). Many of the 'other' answers were repetitions of the respondents' answers to the initial multiple choice question.

#### **TRANSFER DISTANCE OF PLANTS FROM PURCHASE LOCATION TO RESPONDENTS' AQUARIA**

The survey of aquarium owners included questions regarding the purchase location of plants (city/town and province) and the 'home' aquarium location (postal codes of respondents). This information was used to determine transfer distances of purchased plants. The data were first sorted for useable digits (incomplete postal codes, or inaccurate codes were discarded from further analyses). Additionally, many purchase locations were generic, and could not be reliably determined. Following the sorting for quality, 290 responses were suitable for tracking vector movement. Of the 152 respondents that provided suitable data with regards to aquarium location, and plant purchase locations, 69 were located in the greater Toronto area (postal unit 'L'), 40 in southwestern Ontario (postal unit 'N'), 26 in downtown Toronto (postal unit 'M'), 11 in eastern Ontario (postal unit 'K'), and 6 in northern Ontario (postal unit 'P'), respectively. Because respondents often purchased plants from multiple locations, but transported them back to a single aquarium location, the total number of responses providing suitable plant movement data ( $n = 290$ ) is larger than the actual number of respondents ( $n = 152$ ) who provided suitable vector movement data.

Vector movement for each respondent was determined using a Geographic Information System (ArcGIS 9.3) and spatially-explicit postal code and provincial city/town data to describe spatial interaction between origins and destinations. Euclidean (straight-line)

distances were calculated as a surrogate for distances that each respondent travelled. To determine Euclidean distance, each respondent's origin (purchase location) was plotted, followed by his or her final destination (aquarium location; Fig. 9). Euclidean distances (km) were calculated as the shortest linear distance between each origin and destination (Fig. 10). Although Euclidean distances provide reasonable approximations for vector movement, they may underestimate actual distances travelled due to the complexity of provincial road networks.

Euclidean distances were summarized graphically using a box plot (Fig. 11) and a histogram (Fig. 12). Results were characterized by relatively small mean travel distances (89.61 km +/- 18.27 km), but were notable for high variability (variance = 24983.44 km; standard deviation = 158.06 km; coefficient of variation = 176%) and extreme positive-skewness signifying rare, large travel distances (maximum Euclidean distance was 1163 km).

## DISCUSSION

The 'Great Canadian Aquarium Survey' was conducted to determine the extent to which AIS are integrated into the aquarium trade in Canada. Of the aquarium plants and animals in the survey, 11 are noted as AIS, however, the list (aquatic invasive species are listed on the Global Invasive Species Database) of aquatic invasive plant and animal species in Canadian waters is frequently updated, both with newly introduced species and those that will pose a greater risk with climate warming (Crossman and Cudmore 1999). As a result, additional species in this survey may soon be listed as AIS. The list of aquatic invasive plant species found in the aquarium trade includes: Brazilian waterweed (*Egeria densa*), Eurasian water milfoil (*Myriophyllum spicatum*), fanwort (*Cabomba caroliniana*), hydrilla (*Hydrilla verticillata*), parrot's feather (*Myriophyllum aquaticum*), water fern (*Salvinia minima*), water hyacinth (*Eichhornia crassipes*), and water lettuce (*Pistia stratoites*; Table 1). These species share several characteristics including rapid and dense growth, reduction of light penetration, altering of the physical and chemical properties of the waterbodies they invade, and the displacement of native plants that provide food and habitat for native species ([www.invasivespecies.com](http://www.invasivespecies.com)).

There are currently very few common aquarium fish species considered to be significant AIS threats to Canadian waters, primarily because most of the species originate from tropical climates and cannot tolerate the cold northern winter water temperatures (Crossman and Cudmore 1999b). There are, however, certain fishes including Goldfish (*Carassius auratus*), Common Carp (*Cyprinus carpio*), Northern Snakehead (*Channa argus*), and Rainbow Snakehead (*Channa bleheri*), that have demonstrated the ability to survive cold water temperatures (Herborg et al. 2007). It has also been suggested that warm-water outflows from industrial facilities could function as both a refuge from colder temperatures and as a means to acclimate to colder temperatures (Crossman and Cudmore 1999b).

All three of the aquatic invasive fish species that have demonstrated a tolerance for cold water temperatures were identified as being added to aquaria by at least one of the survey respondents. It is, however, possible that if the species of snakehead was released (which was not indicated by the respondent), it would have low habitat suitability in Canada (Herborg et al. 2007) and, therefore, the risk of invasion is minimal. Nevertheless, snakeheads (*Channidae* sp.) are noted as being voracious predators and have demonstrated the capacity to traverse over land for short distances (Cudmore and Mandrak 2005). The introduction of snakeheads could result in the displacement of native fishes, through predation and the competition for food and habitat.

The threat posed by Common Carp and Goldfish include the bottom-sucking feeding habits which result in the suspension of sediment causing increased turbidity of the water, the destruction of rooted aquatic plants, and the reduction of macroinvertebrates through predation and habitat loss ([www.invasivespecies.com](http://www.invasivespecies.com)). Both Common Carp and Goldfish act as competitors for benthic food resources with native fish and have also been found to feed on native fish eggs and fry ([www.issg.org](http://www.issg.org)).

In addition to fishes, respondents indicated the presence of frogs, snails, and turtles in their aquaria. While none of the species of frogs, snails, or turtles noted by respondents are currently listed as an aquatic invasive species threat in Canada, eight of 22 species of introduced molluscs in North America have arrived through the aquarium trade (Mackie 1999). Crossman and Cudmore (1999b) suggest that the aquarium trade represents a level of threat as a vector for AIS introductions and, as such, the species being sold in the industry should be carefully monitored with regular updates on the threats posed by those species.

Introductions from aquaria can occur through both the direct release of the organisms or, as with most snail introductions to aquaria, they may be an unintended introduction as they come attached to plant material and subsequently may be accidentally released when aquarium owners dispose of plants. Most respondents indicated unwanted plants were thrown in the garbage or composted (70%). Additionally, as noted by Crossman and Cudmore (1999b), the effort and expense of maintaining aquaria led to the reluctance of owners to properly dispose of unwanted specimens, and releasing the specimens may seem their most attractive option. Indications from the survey suggest that very few respondents released plants or animals into the wild. Respondents were generally aware that it is ill-advised to release plants and animals into the wild and accordingly may falsify survey responses rather than disclosing their actual practices.

The Euclidean distance travelled by respondents from point of purchase to aquarium location is of particular interest with regards to the spread of AIS. The plant transfer distances calculated from the survey indicated that although the mean transfer distances were relatively small (<90 km), purchases were transferred much farther (maximum Euclidean distance was 1163 km). This potential for long distance transfers must be considered when assessing the threats of AIS arriving at retailers (i.e. the threat of an AIS introduction may extend far beyond the point of purchase).

The "Great Canadian Aquarium Survey" was developed in order to collect information concerning the practices of aquarium owners with specific interest regarding the extent to which AIS were integrated into the trade. The survey helped to create a better understanding of the plants and animals most often selected by aquarists, as well as the distance traveled between purchase locations and water garden locations. The results of the survey indicate the aquarium trade may provide a vector for the introduction of aquatic invasive species into Canadian freshwaters. Further risk assessment studies of the aquarium trade will help to inform the probability of invasive species survival in Canadian ecosystems and level of disturbance that would be expected following successful aquatic invasive species introductions from this pathway.

### ACKNOWLEDGEMENTS

The "Great Canadian Aquarium Survey" was developed by the Ontario Federation of Anglers and Hunters (OFAH), along with partner organizations. We would like to thank the following for their roles in the development and conducting of the survey: Francine MacDonald and Heather Smith (Ontario Federation of Anglers and Hunters); Beth Brownson and Mark Heaton (Ontario Ministry of Natural Resources).

We would also like to thank the volunteers who worked at the booths to distribute the survey, as well as all the respondents of the survey.

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Table 1. Aquatic plants and animals listed as AIS in Ontario. Additional information and species of AIS in Canada can be found at the websites given.

Common Name	Scientific Name	# Occurrences	Invasive Species Information
Brazilian waterweed	<i>Egeria densa</i>	16	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Common Carp (Koi) and Goldfish	<i>Cyprinus carpio</i> and <i>Carassius auratus</i>	88	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	16	<a href="http://www.cws-scf.ec.gc.ca">www.cws-scf.ec.gc.ca</a> <a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Fanwort	<i>Cabomba caroliniana</i>	51	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Hydrilla	<i>Hydrilla verticillata</i>	20	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Parrot's feather	<i>Myriophyllum aquaticum</i>	21	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Snakehead sp.	<i>Channidae</i> sp.	1	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Water fern	<i>Salvinia minima</i>	26	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Water hyacinth	<i>Eichhornia crassipes</i>	22	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>
Water lettuce	<i>Pistia stratoites</i>	40	<a href="http://www.invasivespecies.com">www.invasivespecies.com</a> <a href="http://www.issg.org/database">www.issg.org/database</a>

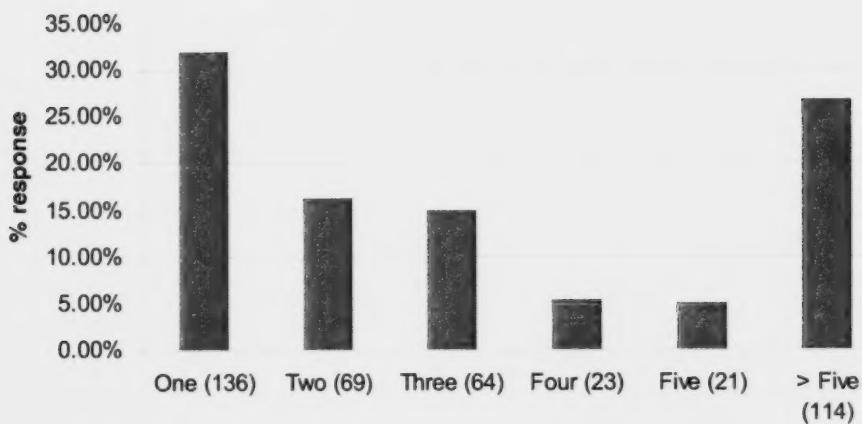


Figure 1. Total number of aquaria owned by respondents (n).

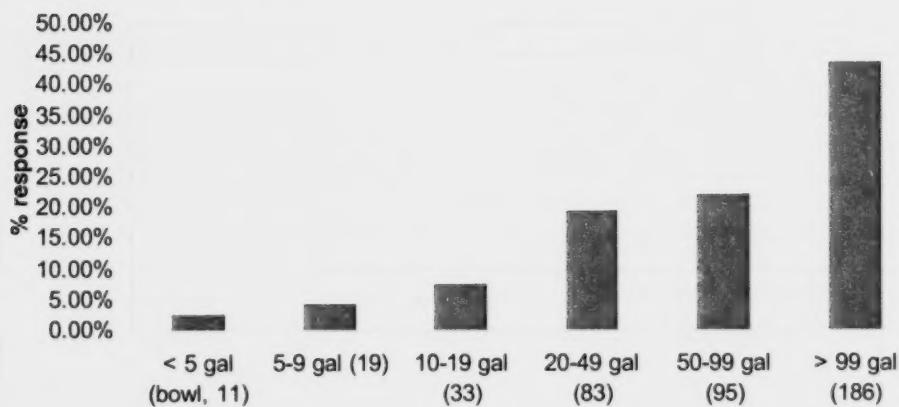


Figure 2. Total size of aquaria owned by respondents (n).

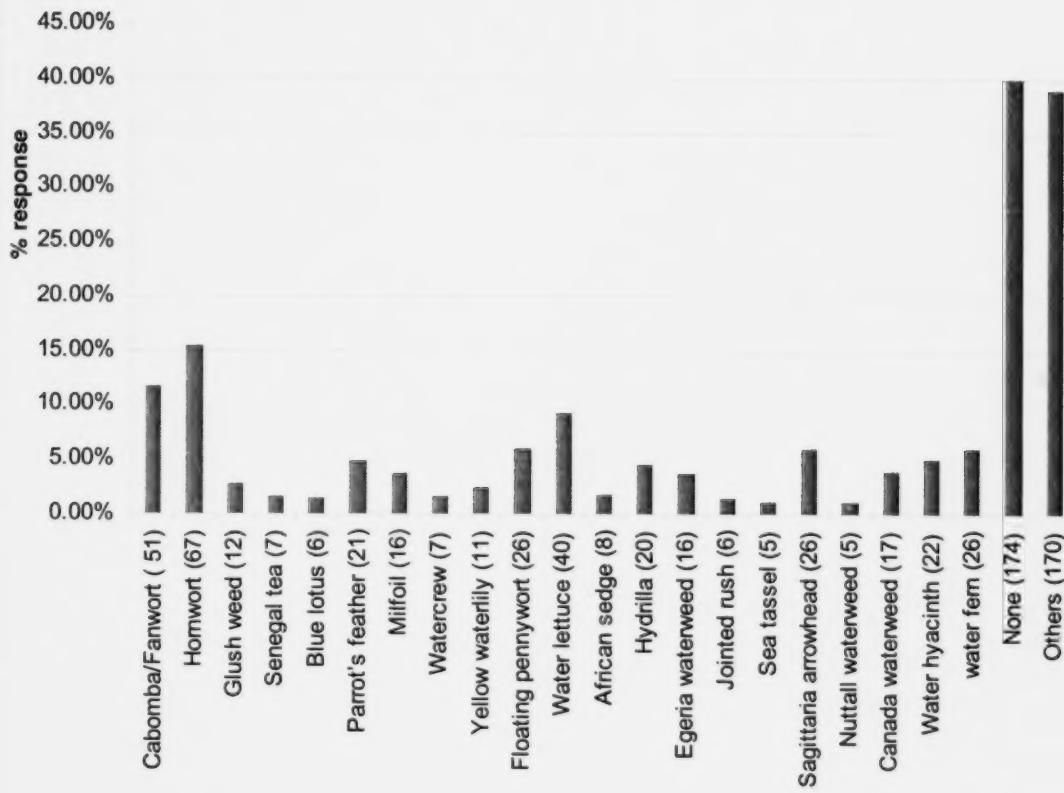


Figure 3. Plants added to aquaria by respondents (n).

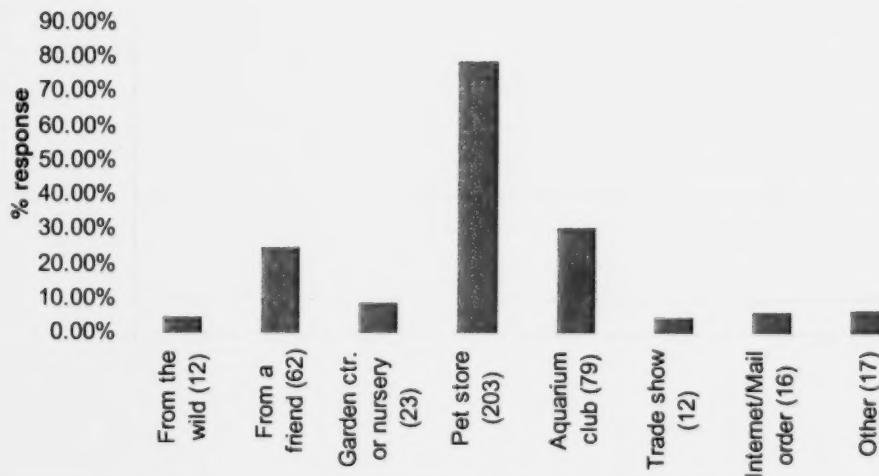


Figure 4. Where respondents acquired their aquarium plants (n).

Figure 4. Where respondents acquired their aquarium plants (n).

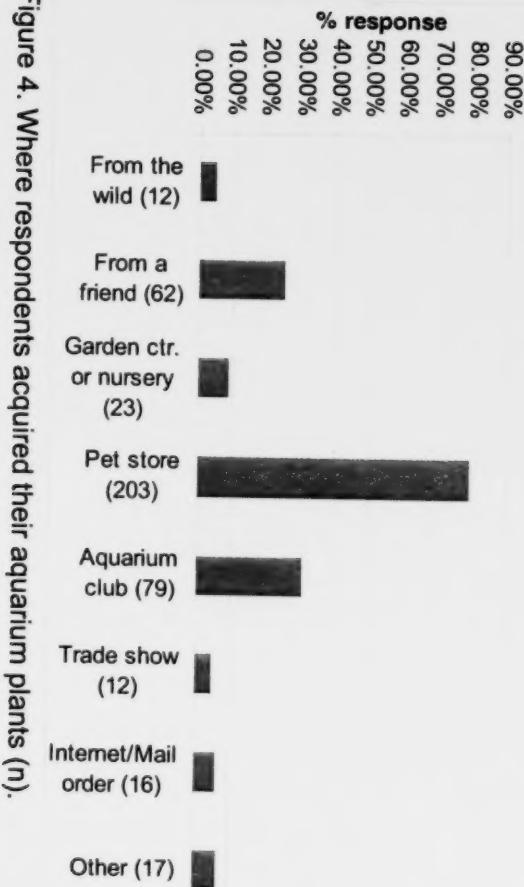


Figure 3. Plants added to aquaria by respondents (n).

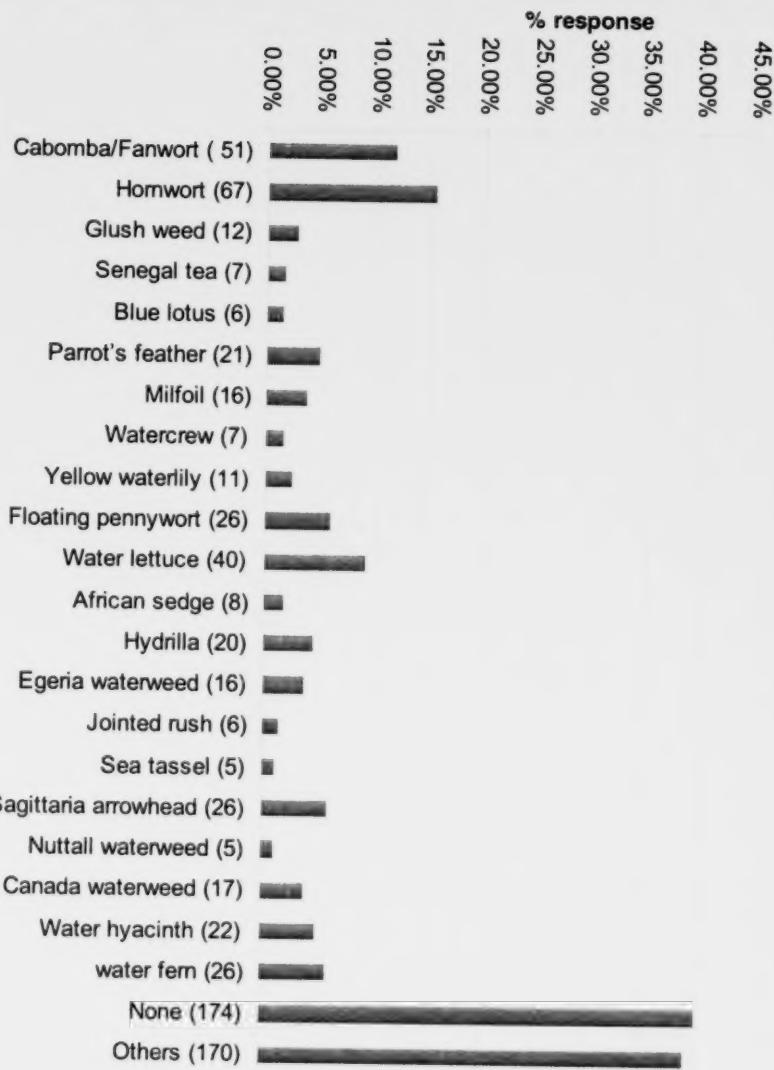


Figure 6. Fish and animals that were added to aquaria by respondents (n).

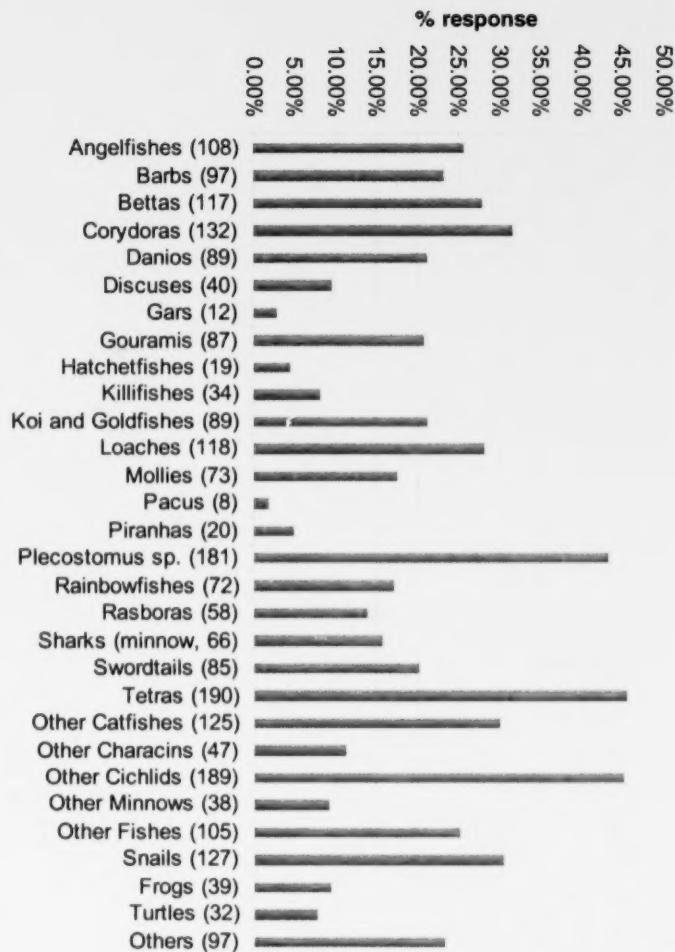
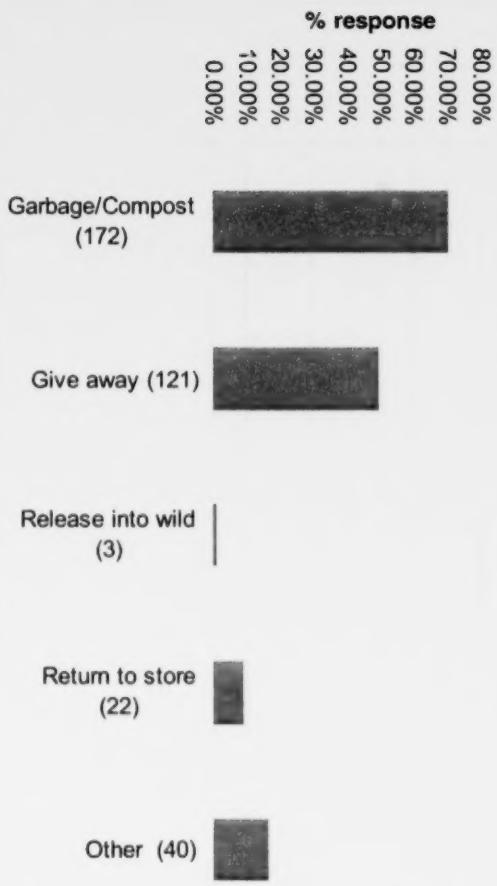


Figure 5. What is done with unwanted aquarium plants (n).



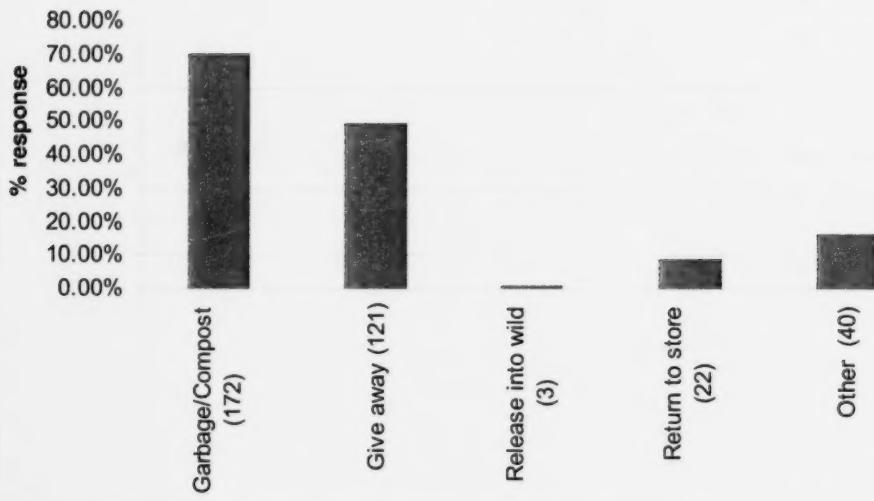


Figure 5. What is done with unwanted aquarium plants (n).

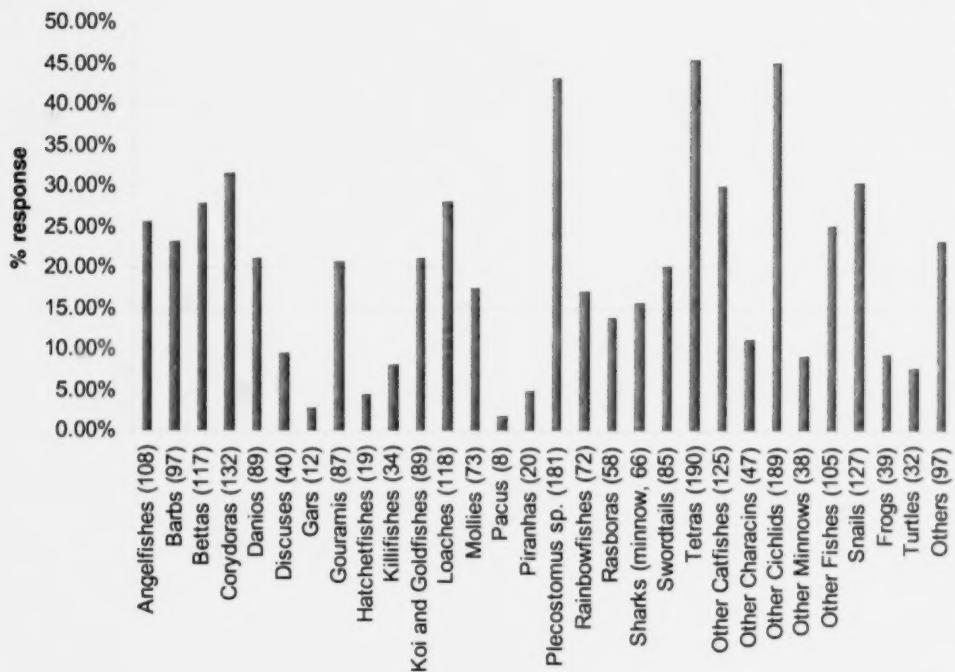


Figure 6. Fish and animals that were added to aquaria by respondents (n).

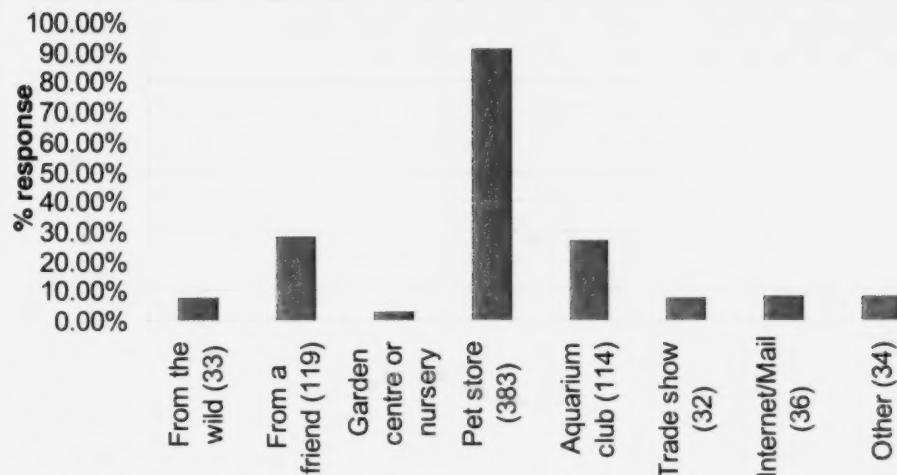


Figure 7. Where respondents acquired their aquarium animals (n).

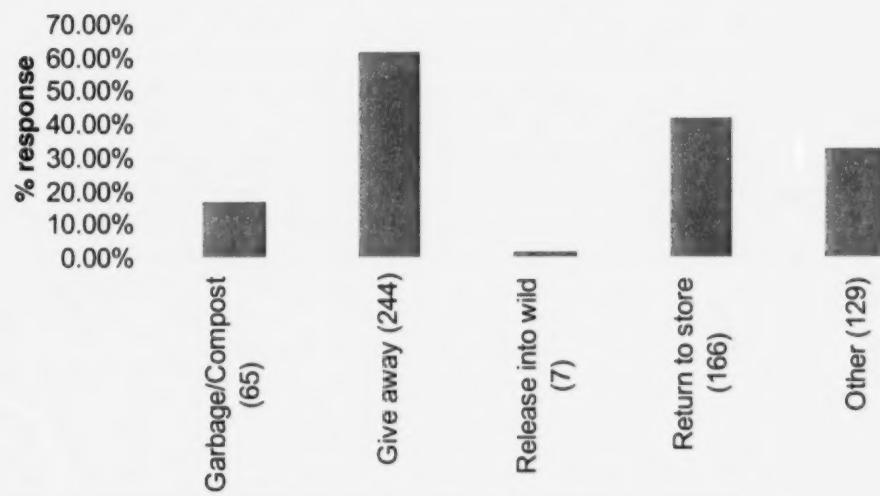


Figure 8. What is done with the unwanted aquarium animals (n).

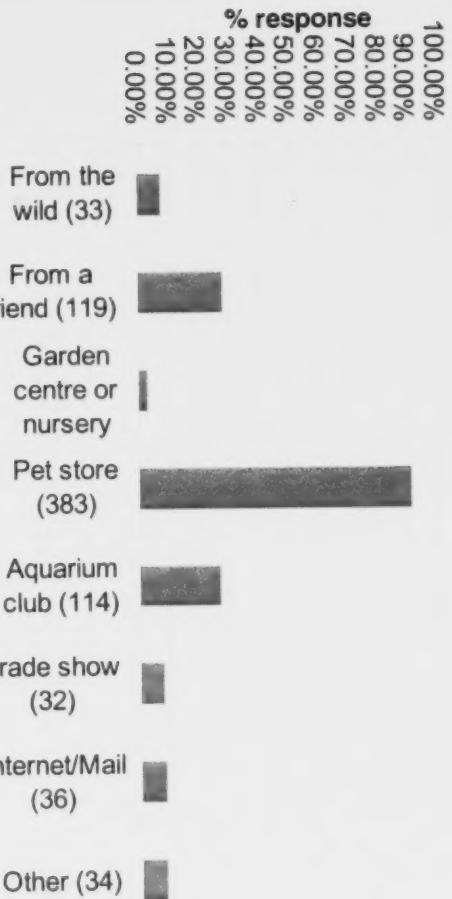


Figure 7. Where respondents acquired their aquarium animals (n).

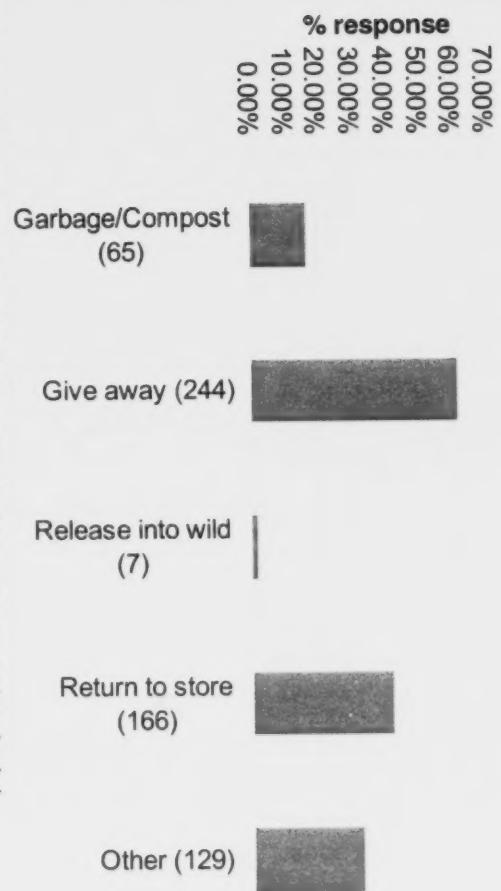


Figure 8. What is done with the unwanted aquarium animals (n).



Figure 9. Aquarium plant origins (aquarium retailer location; ▲) and plant destinations (respondent's aquarium location; ◦) based on  $n = 290$  trips from  $n = 152$  surveyed respondents.



Figure 10. Movement of survey respondents ( $n = 290$  trips from  $n = 152$  respondents) between plant origins (aquarium retailer location;  $\blacktriangle$ ) and destinations (respondents' aquarium location;  $\bullet$ ). Black lines (—) represent Euclidean travel route for each origin-destination pair.

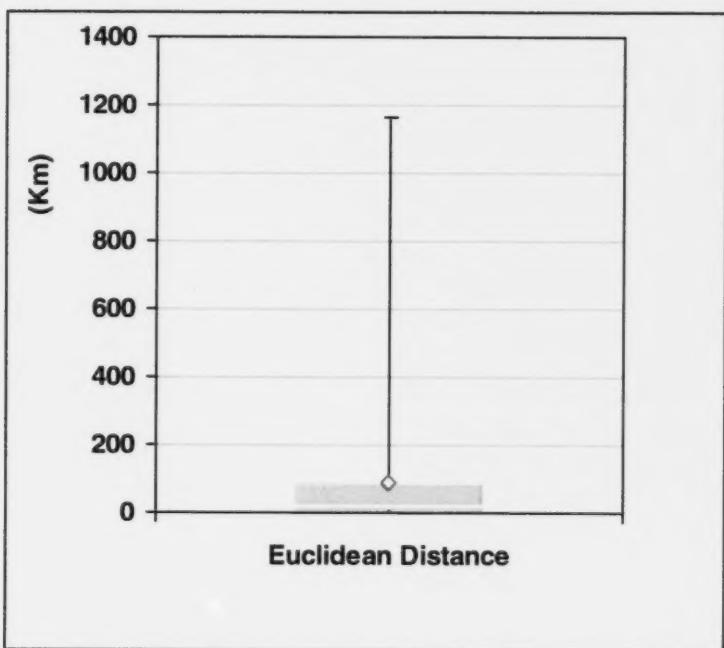


Figure 11. Box plot of Euclidean distance traveled by respondents following plant purchase.

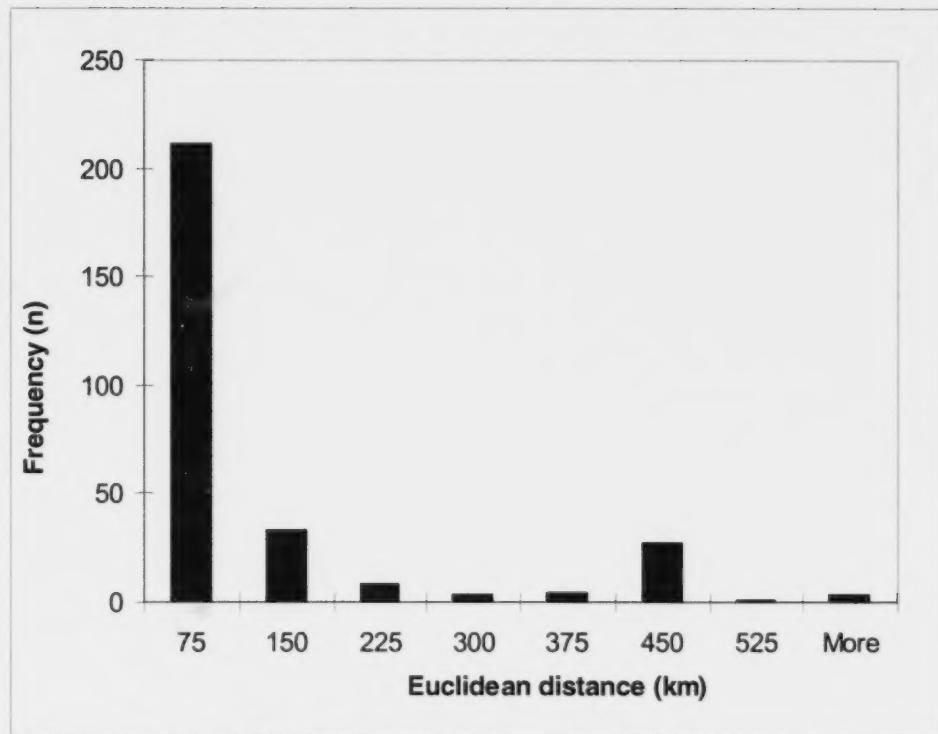


Figure 12. Frequency of Euclidean distance traveled from aquarium plant purchase locations to respondents' aquarium locations.

## Appendix 1. The Great Canadian Aquarium Survey.

## Welcome to The Great Canadian Aquarium Survey.

The purpose of the survey is to get a better understanding of the freshwater plants and animals used by Canadians in their aquariums.

The survey is divided into two parts.

Part A should be completed by all first time users of the survey.

Part B is a shorter survey on our website to be used every time you add freshwater plants or animals to your aquarium – it is like an aquarium logbook.

Choose a unique username and password. Please use the same username and password every time that you fill out Part B on our website. These unique identifiers will be used to track your use of plants and animals in your aquarium through the year **anonymously**. They will in no way be linked to, or reveal, your identity.

Username:  Password:

1. Please provide postal code for where you live.
2. How many freshwater aquariums do you own?
3. How large are your aquarium(s)? all together? Choose one.

- Less than 5 gal (bowl)
- 5-9 gal
- 10-19 gal
- 20-49 gal
- 50-99 gal
- 100+ gal

4. What type of plants have you put in your aquarium? Choose all that apply.

- African sedge (*Cyperus involucratus*)
- Blue lotus (*Nymphaea caerulea*)
- Cabomba/Fanwort (*Cabomba caroliniana*)
- Canada waterweed (*Elodea canadensis*)
- Egeria waterweed (*Egeria densa*)
- Floating pennywort (*Hydrocotyle ranunculoides*)
- Glush weed (*Hygrophila costata*)
- Hornwort (*Ceratophyllum demersum*)
- Hydrilla (*Hydrilla verticillata*)
- Jointed rush (*Juncus articulatus*)
- Milfoil (*Myriophyllum spicata*)
- Nuttal waterweed (*Elodea nuttallii*)
- Parrot's feather (*Myriophyllum aquaticum*)
- Sagittaria arrowhead (*Sagittaria graminea*)
- Salvinia (water fern) (*Salvinia molesta*)
- Sea tassel (*Ruppia maritima*)
- Senegal tea (*Gymnocoronis spilanthoides*)
- Watercrew (*Rorippa nasturtium-aquaticum*)
- Water hyacinth (*Eichornia crassipes*)
- Water lettuce (*Pistia stratoites*)

Yellow waterlily (*Nymphaea mexicana*)

Other:

5. Where did you get your aquarium plants?

Choose all that apply.

- From the wild
- From a friend
- Garden centre or nursery
- Pet store
- Trade show
- Internet/Mail order

Other:

6. List the top three locations (cities or towns) where you buy/collect your aquarium plants.

City: Prov:

City: Prov:

City: Prov.

7. If you purchased your aquarium plants by internet or mail order, please provide company name.

8. What do you do with your aquarium plants if no longer wanted? Choose all that apply.

- Garbage/Compost
- Give to another aquarist
- Release into wild
- Return to store

Other:

9. What type of freshwater animals do you have in your aquarium? Choose all that apply.

Type of Animal	List Species
<input type="checkbox"/> Angelfishes	
<input type="checkbox"/> Barbs	
<input type="checkbox"/> Bettas	
<input type="checkbox"/> Corydoras	
<input type="checkbox"/> Danios	
<input type="checkbox"/> Discus	
<input type="checkbox"/> Gars	
<input type="checkbox"/> Gouramis	
<input type="checkbox"/> Hatchetfishes	
<input type="checkbox"/> Killifishes	
<input type="checkbox"/> Koi and Goldfishes	
<input type="checkbox"/> Loaches	

<input type="checkbox"/> Mollies	
<input type="checkbox"/> Pacus	
<input type="checkbox"/> Piranhas	
<input type="checkbox"/> Plecostomus	
<input type="checkbox"/> Rainbowfishes	
<input type="checkbox"/> Raspboras	
<input type="checkbox"/> Sharks (minnow)	
<input type="checkbox"/> Swordtails	
<input type="checkbox"/> Tetras	
<input type="checkbox"/> Other Catfishes	
<input type="checkbox"/> Other Characins	
<input type="checkbox"/> Other Cichlids	
<input type="checkbox"/> Other Minnows	
<input type="checkbox"/> Other Fishes	

10. Where did you get your aquarium animals? Choose all that apply.

- From the wild
- From a friend
- Garden centre or nursery
- Internet/Mail order
- Pet store
- Trade Show

Other:

11. List the top three locations (cities or towns) where you buy/collect your aquarium animals.

City: Prov:

City: Prov:

City: Prov.

12. If you purchased your aquarium animals by internet or mail order, please provide company name.

13. What do you do with your aquarium animals if no longer wanted? Choose all that apply.

- Garbage/Compost
- Give to another aquarist
- Release into wild
- Return to store

Other:

Thank you for completing our survey. Please go to our website to fill out Part B every time you add freshwater plants and animals to your aquarium.

[www.surveymonkey.com/aquarium\\_survey](http://www.surveymonkey.com/aquarium_survey)



